Specification Amendment Schedule

Page 4 last paragraph, amend as follows:

For a fuller understanding of the nature and objects of the invention, reference should be made to the following detailed description taken in connection with the accompanying drawings, in which:

FIG. 1 is a schematic view of an optical transmission network embodying our invention;

FIG. 2A is a longitudinal cross-sectional view of an optical signal extractor used in the FIG. 1 network;

FIG. 2B is an exploded perspective view of parts of the FIG. 2A extractor;

FIG. 3 is a schematic diagram of a nanosecond optical switch used in the FIG. 1 network~~, and~~;

FIG. 4 is a schematic diagram showing the operation of the FIG. 3 switch.

FIG. 5 is a diagrammatic view of a cross-over used in the FIG.1 network;

FIG. 6A is a sectional view on a larger scale taken along line 6A-6A of FIG. 5, and

FIG. 6B is a similar view taken along line 6B-6B of FIG. 5.

Page 5 third full paragraph, amend as follows:

The tuned lambda extractor 10 shown in FIGS. 2A and 2B includes a cylindrical resonant cavity 12 having end mirrors 13 (full) and 14 (partial) and that surrounds the sending fiber 1 so it can interact with the evanescent waves which envelop that fiber. These waves will resonate in the cavity 12, building up energy, and exit through the partially transparent mirror 14 into the glass fiber stem 16 which surrounds the naked fiber. The length of the cavity 12 for a λ of 1.55 μm is 0.3 mm.

Page 6 penultimate paragraph, amend as follows:

The Brewster Angle $\underline{\theta}$ is defined as that angle of incidence at which p- polarized light will have no reflection when entering and exiting the reflector plate. If n_B is the index of refraction of this plate then

$$\tan \underline{\theta} = n_B$$

Pages 6 and 7, bridging paragraph, amend as follows:

For s polarization there will however be a strong reflection. By choosing a material with a high index, this reflection will be stronger. Silicon has an index of refraction of 3.346 at 1.55 micrometer. The corresponding Brewster Angle is 73.36°. There is zero reflection and 100% transmission for p- polarized light. S- polarized light will be reflected but a small amount will also go through the plate. The thickness of the Si plate can be chosen such that the reflections at the top and bottom of the plate interfere constructively. A reflection of 96.85% is achieved with a Si plate thickness of 0.122 µm. By using two plates of thickness 0.122 µm, and separated by about 1.25 µm this reflection increases to 99.974%. For two plates, the amount of s- polarized light transmitted will be 0. 5%. If one desires a higher degree of suppression of transmitted s- polarization, a third plate can be used or a blocking filter for s-polarization can be added. The small Brewster plates can be made by conventional deposition techniques using an easily dissolvable intermediate layer.

Pages 8 and 9, bridging paragraph, amend as follows:

~~The~~ Referring to FIGS. 5A and 6B, switch 22 employs one movable, friction-less ~~component~~ oculus 32 for each flexing sending fiber $\underline{F_S}$ to achieve the direct projection of the collimated laser beamlets B onto the receiving fiber $\underline{F_R}$ ends. This creative approach results in simplicity, reliability, and lower manufacturing cost.

Page 9 before the first full paragraph, please insert the following paragraph:

Each oculus 32 consists of a spherical shape preferably made of glass that can rotate like an eyeball in a socket 33 formed in a face plate 34 at plane 24. The plate 34 is of

split design to allow insertion, rotation and movability of the oculus. Within the spherical body of each oculus 32 is a minilens 36 that collects the light exiting from the fiber F_S that is tied to the end of the oculus 32 and from there funneling the collected light toward a collimator lens 38 so as to generate a parallel laser beam whose direction can aim transversally across a space to a selected collector lens 42 in a plate 44 at plane 26 with the distance from the oculus to the collector lens being of no consequence since the laser beam is parallel by nature and tiny in diameter without being affected by dispersion events.

Page 9, first full paragraph, amend as follows:

Assuming a matrix of 33 x 33 = 999 sending fibers F_S in a square bundle arriving at the switching plane 24 with each fiber having a 1 mm pitch, then the dimension of this square block is 33 x 33 mm. By placing the receiving fibers F_R 100 mm away in a receiving plane 26, the angular coverage between the two planes requires a maximum tilt angle of 18.26°. Fibers have finite angles of acceptance for incoming light. Since the fiber cladding has an index that is only smaller, by about 1%, relative to the core index the acceptance angle is of the order of ± 8°. We would exceed this acceptance angle by a tilt angle of our projecting optics of ±18°. We must also consider that the cone angle of the light produced by the focusing lens at the receiving fiber is also limited by the ± 8°. To accommodate these requirements, we use rotatable optics so that the sending and receiving optics look directly at each other with perpendicular exit and entrance beams. For the collimated beam diameter we have chosen a diameter of 1 mm.

The beam would expand because of diffraction in a distance of I=10 cm by

$\frac{\lambda}{D} I \approx 0.155mm$, where λ is the wavelength, D is the beam diameter, and I the lens separation. Thus the light loss from spillover is slight. Also crosstalk is limited and can be further reduced by a slightly larger spacing of the fibers. The collimating lens at the receiving end needs to be able to focus the beam to a diameter of the order of the core diameter of the fiber or about ~~8 mm~~µm. This means that the focal length needs to be f = 3.56 mm

or larger (numerical aperture of .139) in order to accommodate the maximum light acceptance angle of the fiber. The diffraction limited spot size is then about λ/DF ~ 5.5 μm~~mm~~, which accommodates the assumed 8 μm~~mm~~ core diameter.

Page 9, last paragraph, amend as follows:

Now, with the exit pupils of the incoming fibers at plane ~~22~~ 24 being movable, sweeping to any point within the angle of 20° to reach plane ~~24~~26, the angle of incidence on the fiber ends at plane 26 never exceeds 20°. This is important because 27° would exceed the allowable angle of incidence.

Page 10, first paragraph, amend as follows:

The geometry of plane 26 not ~~on~~ only reduces the angle of incidence to zero, but it also makes room between the individual fibers to place position-sensing marks that will provide feedback verification regarding the accurate placement of the multiple beams. This is done via thin rings of upconverting phosphors that are printed around each fiber location and illuminated via co-parallel light with the primary laser beams that will assure, if not lit up, the precise alignment of each beam to the outgoing fiber core. A vidicon tube will automatically inspect the absence of aberrant illumination. Alternate feedback methods are also being considered.

Page 10, second full paragraph, amend as follows:

As stated above, the oculi and their pupils at plane ~~22~~ 24 are controllably movable, emitting collimated beamlets of light of typically ~~5~~ 1 mm diameter. The oculi feature small spherical lenses that are inserted into X/Y moving spheres whose position is controlled via feedback using simple electro-strictive members.

Current Claims Schedule

1.-14. (Cancelled).

15. (New) An optical information transmission network comprising a set of optical sending devices located in a first plane and a set of optical receiving devices located in a second plane spaced opposite the first plane, each receiving device including a converging lens in said second plane and a corresponding receiving fiber for receiving light transmitted by the corresponding converging lens and each sending device including an oculus rotatably mounted in the first plane and adapted to be aimed at the converging lens of any selected one of the set of receiving devices and a sending fiber attached to that oculus.

16. (New) The network defined in claim 15 wherein each oculus in the set of sending devices is rotatably mounted in a plate located in the first plane and each converging lens of the set of receiving devices is mounted in a second plate located in the second plane.

17. (New) The network defined in claim 16 wherein each oculus comprises a body including a spherical lens for transmitting light from the fiber attached to that oculus.

18. (New) The network defined in claim 17 wherein each oculus comprises a glass sphere including a collimating lens and a mini-lens located between the collimating lens and the fiber attached to that oculus.

19. (New) The network defined in claim 15 and further including means for aiming each oculus in response to a selected optical control signal.

20. (New) The network defined in claim 19 and further including an extractor for extracting the optical control signal from an optical input signal.

21. (New) The network defined in claim 20 wherein the optical input signal and the optical control signal have different wavelengths.